College of Liberal Arts and Sciences

Division of Statistics

Applied Probability and Statistics

Master of Science

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1. Student Learning Outcomes

List the degree program student learning outcomes in the space provided below. Do not include overall program goals (e.g., recruit more minority students, post-graduation employment, etc.). See the *UAP Academic Program Assessment Plan and Status Report Rubric-Checklist* for a list of characteristics often seen in well-crafted student learning outcomes. It is not expected that all characteristics are present, but that essential ones are there, such as:

- outcomes are student learning focused;
- outcomes are observable and measurable;
- a sufficient number of outcomes to add depth/breadth (>3), but so many as to become cumbersome/intrusive (<12), 6-8 is manageable (unless mandated by accreditation); and
- outcomes differentiate the program from similar programs.

The goal is to continually improve student learning outcomes over time. Aim for higher order and more valued outcomes. Take the next step.

Insert degree program student learning outcomes here.

The student learning outcomes for the M.S. Program in Applied Probability and Statistics are

1. Formulation of statistical problems: Students should be able to formulate real-world applications within the proper statistical framework. This includes designing studies and experiments that will provide the proper type of evidence to prove or disprove a hypothesis, along with the proper theoretical statistical framework for providing reliable and logical conclusions based on the observed data from the experiment.
2. Essential skills for statistical analysis: Students should be able to use data obtained from real world experiments to obtain the proper calculations and conclusions based on sound statistical practice and theory.
3. Knowledge of data analysis: Students breadth of knowledge of statistical methodology should be broad enough so that they will be able to address a wide variety of statistical problems often encountered in real-world applications.
4. Effective oral and written communication skills: Students should be able to effectively communicate their results to those within the field of statistics, as well as to those who may only have very basic statistical training. Students should be able to effectively address how experiments are designed as well as how the results of a statistical analysis should be interpreted. In particular, students should be able to communicate what types of logical conclusions are permissible based on a statistical analysis.
5. Working knowledge of popular statistical software: Students should be proficient in the most common types of statistical software used in industry and academics.

2. Program-by-Baccalaureate Student Learning Outcomes Matrix

This second section of the assessment plan is optional but **highly encouraged**. It is an alignment of your degree program student learning outcomes with the university baccalaureate student learning outcomes. **This applies only to undergraduate degree programs.**

This section has not been included since the program is at the graduate level.

3. Curriculum Map

The third section is a curriculum map (and is also optional but **highly encouraged**). A curriculum map outlines the scope and sequence of courses students will take and aligns them with the degree program student learning outcomes. The curriculum map is an effective tool for not only sequencing the curriculum and instruction, but also for strategically identifying places for formative and summative assessments of student learning outcomes.

Required core courses are listed along the vertical axis of the matrix in chronological order. Degree program student learning outcomes are listed on the horizontal axis. For each course determine: (1) which outcomes are the **primary** focus of the course, and (2) the degree to which the course supports the outcome (i.e., at a beginning (B), developing (D), or proficient (P) level). Place a B, D, or P in the corresponding cell. It would be *unusual* to find all courses supporting all student learning outcomes—instead, concentrate on the primary focus of each course. This will map out the degree to which core courses support the development of your program student learning outcomes. The Four-Year Degree Path provided by the Office of Student Academic Success may be helpful (http://www.niu.edu/osas/DegreePaths/). Look for strengths and gaps in the curriculum. Ideally, all outcomes should be supported with coursework through the proficient level. Below is an example of a curriculum map you can modify or model. Note that each course should address at least one student learning outcome, but does NOT have to support all learning outcomes.

Course	Program Student Learning Outcomes				
	1. Formulation of statistical problems	2. Essential skills for statistical analysis	3. Knowledge of data analysis	4. Effective oral and written communication skills	5. Working knowledge of statistical software
STAT 572	D	D			
STAT 574		D	D	D	D
STAT 672	P	P			
STAT 673	P		P		
STAT 691	P	P	P	P	P
Note. Course Supports outcome at the B = beginning, D = developing, or P = proficient level.					

4. Assessment Methods

Assessment Method	Explanation				
	Description	Student-Level Achievement [a]	Program-Level Target [b]	When Data Will be Collected	Person Responsible
Thesis	Assessment of the six student learning outcomes for each thesis using the provided rubric.	Student should be proficient for all six student learning outcomes.	All students should be proficient for all six student learning outcomes.	Each semester	Director of Graduate Studies
Comprehensive Examination	Assessment of the six student learning outcomes, except oral communication, for each comprehensive examination using the provided rubric.	Student should be proficient for all six student learning outcomes.	All students should be proficient for all six student learning outcomes.	Each Semester	Director of Graduate Studies
Exit Surveys. Assesses the impressions and outlook of the graduates upon completion of the M.S. program.	Each student is encouraged to fill out an online survey on their experiences in the program. The survey specifically addresses the exposure of students to different topics in the program as well as their self-scored proficiency in each.	Each student will provide a self-evaluated proficiency score for each area in the survey.	75% of the students surveyed should feel proficient in each of the areas addressed by the survey.	At the end of each Spring semester.	Director of Graduate Studies, Office manager
University Alumni Survey	Analysis of data provided from Question 14 (My graduate degree program at NIU prepared me well for my current job) of the university alumni survey.	Each student indicates the level of agreement with the statement "My graduate degree program at NIU prepared me well for my current job".	50% of the students surveyed should agree or strongly agree that their degree prepared them for their current job.	Each year using data provided by the university.	Director of Graduate Studies

Skills in Statistical Consulting	Each student will be assessed at the end of their experience in STAT 691 (Statistical Consulting) on their proficiency in their statistical analysis and communication skills using a student level survey completed by the course instructor using the provided rubric.	Each student will be graded as beginning, developing, proficient, or accomplished in each student learning outcome.	75% of the students should be at least proficient in each of the areas addressed by the survey.	At the end of any semester that STAT 691 is taught.	STAT 691 course instructor
Basic Skills in Statistical Analysis	Each student will be assessed at the end of their experience in STAT 574 (Statistical Methods and Models) on their proficiency in their formulation and analysis of statistical problems, and communication skills using a student level survey completed by the course instructor using the provided rubric.	Each student will be graded as beginning, developing, proficient, or accomplished in each student learning outcome.	75% of the students should be at least proficient in each of the areas addressed by the survey.	At the end of any semester that STAT 574 is taught.	STAT 574 course instructor
Entry into PhD Programs	As part of the exit survey, the percentage of students who seek and gain admission to a doctoral program in statistics will be reported.	Each student will report whether they sought admission to a doctoral program and whether they were accepted.	75% of the students who seek admission into a doctoral program should gain admittance.	At the end of each Spring semester.	Office manager

Note. [a] Student-level target is the score or performance an individual student must demonstrate to say the student met the student learning outcome. [b] Program-level target is the percent of all students that must demonstrate they meet the student learning outcome.

This final section of the assessment plan describes the assessment methods your degree program will be using to measure how well students are meeting program student learning outcomes. See the *UAP Academic Program Assessment Plan and Status Report Rubric-Checklist* for a description of characteristics seen in well-functioning assessment methods.

Explanation of Assessment Methods Table

The first part of the assessment methods section is an explanation of each assessment method you will be using to measure student learning outcomes. The description needs to be in enough detail to communicate to others what each assessment is, when it will be given, who is responsible for carrying out the assessment, what the desired target level of individual student performance is (to say a single student met the student learning outcome(s)), and

what the desired overall target level of performance is for all students (to say the program is meeting the outcome(s)). Individual student-level achievement targets are often preset scores on an exam, scores on a rubric, etc. Program-level targets are often expressed as the percent of students demonstrating they meet individual student-level achievement targets. See the *UAP Academic Program Assessment Plan and Status Report Rubric-Checklist* for a list of characteristics seen in well-functioning assessment methods. Below is the table you should use to clearly communicate each of the assessment methods to other stakeholders.

Assessment Methods-by-Outcomes Matrix

The assessment methods section concludes with an assessment methods-by-outcomes matrix that maps which assessments will measure a given student learning outcome. Use your curriculum map to identify key places in the curriculum where you could capture already existing assessment data to use as a measure of program student learning outcomes (e.g., major projects/performances, capstone experiences, etc.). Outcomes are listed in the first row, and each assessment method is listed in the first column. It is useful if assessments are listed in chronological order, from the first students will see, to the last. For each assessment method determine: (1) which outcome(s) it **primarily** measures, (2) if it is being used for formative (F) or summative (S) purposes, and (3) whether it is an indirect (I) or direct (D) measure of the student learning outcome. Formative assessments occur earlier in the curriculum and are used to see if students are on track and progressing sufficiently; summative assessments occur at or near the end of the curriculum and are used to see if students have successfully met the program student learning outcomes. Direct assessments are those that compellingly and clearly measure student performance (e.g., exam score, performance assessment, direct observation). Indirect assessments are rough estimates and proxies of student performance (e.g., self-reports of learning, alumni perceptions, etc.). Place an F or S <u>and</u> an I or D in the corresponding cell. This will map out where your degree program is planning to conduct formative and summative assessments using direct and/or indirect methods. Look for opportunities and gaps. *Capitalize on what you are already doing.* See how it aligns with the curriculum map. Below is an example of an assessment methods-by-outcomes matrix you can modify or model. Note that each assessment method does NOT have to measure ALL student learning outcomes. All assessment methods should be explained in the *Explanation of Assessment Methods* table.

Assessment Method	Program Student Learning Outcome				
	1. Formulation of statistical problems	2. Essential skills for statistical analysis	3. Knowledge of data analysis	4. Effective oral and written communication skills	5. Working knowledge of statistical software
Thesis	S, D	S, D	S, D	S, D	S, D
Comprehensive Examination	S, D	S, D	S, D	S, D	
Exit Survey	S, I	S, I	S, I	S, I	S, I

UAP Academic Program Assessment Plan and Status Report Rubric-Checklist

Assessment Method	Program Student Learning Outcome				
	1. Formulation of statistical problems	2. Essential skills for statistical analysis	3. Knowledge of data analysis	4. Effective oral and written communication skills	5. Working knowledge of statistical software
Alumni Survey	S, I	S, I	S, I	S, I	S, I
Skills in Statistical Consulting	S, D	S, D	S, D	S, D	S, D
Basic Skills in Statistical Analysis	F, D	F, D	F, D	F, D	F, D
Entry into PhD Programs		S, I	S, I	S, I	
Note. F=formative assessment, S=summative assessment, D=direct assessment, and I=indirect assessment					